



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US99/12118 (22) International Filing Date: 01 June 1999 (01.06.1999) (30) Priority Data: 09/105,406      26 June 1998 (26.06.1998) US 09/241,188      01 February 1999 (01.02.1999) US (60) Parent Application or Grant AMERICAN EXPRESS TRAVEL RELATED SERVICES COMPANY, [/]; (). BLANDINA, Michael [/]; (). BERRY, Robert [/]; (). BELCZYNSKI, Mari [/]; (). SOBELMAN, Howard, I. ; ().	Published	
(54) Title: <b>STORED VALUE TRANSACTION SYSTEM INCLUDING AN INTEGRATED DATABASE SERVER</b> (54) Titre: <b>SYSTEME DE TRANSACTION DE VALEURS STOCKEES COMPRENANT UN SERVEUR AVEC BASE DE DONNEES INTEGREE</b>  (57) Abstract <p>An integrated database and information server are provided that efficiently share information and tasks between various stored value programs. A server is configured to provide reusable objects and data structures that are suitably shared between various stored value products. A database at the server allows data to be shared between various programs so that each consumer associates with only one database record even though that consumer may use multiple shared value products. An exemplary common record for a consumer includes information relating to mailing addresses, preferred language, and the like. By integrating modules and avoiding duplicate records, the record communicates with all stored value programs, so the information does not need to be repeatedly entered into the database. Moreover, new stored value products are quickly and easily created through selection and arrangement of various shared objects preferably maintained within the database.</p> (57) Abrégé <p>L'invention concerne une base de données intégrée et un serveur d'informations permettant de partager de manière efficace des informations et des tâches entre les différents programmes de valeurs stockées. Un serveur est configuré de manière à produire des structures réutilisables d'objets et de données qui sont partagées de manière convenable entre les différents produits de valeurs stockées. Une base de données au niveau du serveur permet le partage des données entre divers programmes de sorte que chaque client soit associé à un seul enregistrement de la base de données indépendamment de la quantité de produits de valeurs stockées qu'a utilisé ce client. Un enregistrement habituel pour un client comprend les informations ayant trait à des adresses d'envoi, à une langue préférentielle et analogues. Le fait d'intégrer des modules et d'éviter les enregistrements en double permet la communication de l'enregistrement avec tous les programmes de valeurs stockées de sorte que les informations n'aient pas à être saisies de manière répétée dans la base de données. En plus, les nouveaux produits de valeurs stockées sont créés rapidement et facilement par l'intermédiaire de la sélection et de la disposition de différents objets partagés conservés de préférence dans la base de données.</p>		

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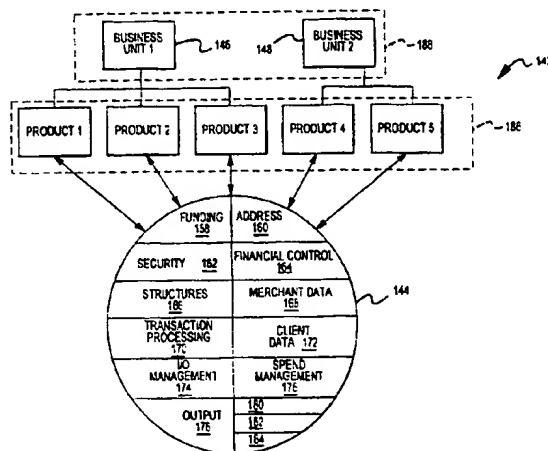
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(54) Title: STORED VALUE TRANSACTION SYSTEM INCLUDING AN INTEGRATED DATABASE SERVER



(57) Abstract

An integrated database and information server are provided that efficiently share information and tasks between various stored value programs. A server is configured to provide reusable objects and data structures that are suitably shared between various stored value products. A database at the server allows data to be shared between various programs so that each consumer associates with only one database record even though that consumer may use multiple shared value products. An exemplary common record for a consumer includes information relating to mailing addresses, preferred language, and the like. By integrating modules and avoiding duplicate records, the record communicates with all stored value programs, so the information does not need to be repeatedly entered into the database. Moreover, new stored value products are quickly and easily created through selection and arrangement of various shared objects preferably maintained within the database.

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**Description**

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STORED VALUE TRANSACTION SYSTEM INCLUDING  
AN INTEGRATED DATABASE SERVER

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FIELD OF THE INVENTION

The present invention relates generally to financial transaction systems, and more particularly, to a computer server and architecture for managing financial transactions involving stored value products such as smartcards.

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10 BACKGROUND OF THE INVENTION

Financial systems using stored value products are well-known in the art. An example of a stored value product is a pre-paid telephone card, which is typically a plastic or paper card with a unique identification code. The code may be printed on the front of the card, or it may be stored electronically on a magnetic stripe that is attached to the card. To access the value on the card, consumers may, for example, dial a pre-determined phone number and input the unique code, thereby identifying the card and allowing the consumer to access a service (such as long distance telephone service). Besides telephone services, magnetic stripe cards have been used to pre-pay for, among other things, gasoline or department store merchandise. In these industries, special card reading machines such as those found in many retail establishments (e.g. point of sale (POS) terminals) are typically configured to read the magnetic stripes incorporated onto the card.

A relatively new stored value technology is the smartcard which typically replaces the magnetic stripe with a microprocessor. Other stored value

5 products include, for example, ATM cards, at-home banking and many  
Internet commerce products.

10 Stored value products have been suggested as a replacement for cash  
in many transactions because such products have been shown to be secure  
5 and convenient without compromising the privacy of the user. Consumers  
frequently purchase stored value cards for pre-determined amounts, or,  
15 alternatively, the card may be configured to hold an electronic representation  
of value that the consumer has purchased.

20 However, unlike cash transactions, stored value transactions typically  
10 utilize an administrator to facilitate card creation, card distribution, transaction  
management, and/or the like. Administering institutions frequently support  
25 multiple stored value products through computer systems that are configured  
to track information such as card balances, consumer mailing addresses,  
30 financial transactions and/or the like. The interfaces and components  
15 associated with each stored value product (smartcard, phone card, ATM card,  
etc) often require that each product be administered by a dedicated computer  
35 system. Accordingly, when administering institutions support multiple stored  
value products, they often support multiple computer systems. As shown in  
40 Figures 1A and 1B, these computer systems are frequently disjoint systems  
20 configured to support only one particular stored value product. These disjoint  
systems are usually inefficient because they often incorporate substantial  
45 duplication in data and administrative overhead. For example, functions that  
are commonly implemented on each administration system include, among  
50 others: adding new cards, enrolling customers in new accounts, issuing

5 personal identification numbers (PINs), adding value to smartcards and other  
accounts, handling transactions (merchant, ATM, telephone, etc.), and  
generating reports (such as billing statements and letters to consumers). An  
10 example of such a prior art pre-paid card system is disclosed in U.S. Patent  
5 No. 5,577,109 issued on November 19, 1996 to Stimson et al., which is  
incorporated herein by reference. Similarly, a system for supporting multiple  
15 functionality on a single card is disclosed in U.S. Patent No. 5,574,269 issued  
on November 12, 1996 to Mori et al., which is incorporated herein by  
20 reference.

10 Recently, as shown in Figure 1B, some disjoint administrative systems  
have become somewhat more integrated through the sharing of limited  
25 functionality such as card authorization and transaction processing.  
Although this arrangement is improved over that of Figure 1A in that it is  
30 somewhat less redundant, the Figure 1B arrangement still includes  
15 substantial duplication of information and administration because each  
program incorporates data records and general parameters such as currency  
35 type, language used, etc. Disjoint systems exhibit a further disadvantage in  
that each administration system is typically individually constructed, thus  
40 requiring excessive time, labor and expense to create, maintain and operate.

20 Accordingly, there exists a need for a card management system that will  
simultaneously support various stored value products and their associated  
45 functions. Such a system is needed to reduce implementation times, to  
improve data processing efficiency and to reduce administrative overhead for  
50 each system.

## SUMMARY OF THE INVENTION

An integrated database and information server are provided that efficiently share information and tasks between various stored value programs. A server is configured to provide reusable objects and data structures that are common to multiple stored value programs. A database at the server allows data to be shared between various shared value product programs so that each consumer associates with only one database record even though that consumer may use multiple stored value products. An exemplary common record for a consumer includes information relating to mailing addresses, preferred language, and the like. By integrating modules and avoiding duplicate records, the record communicates with all stored value programs, so the information does not need to be repeatedly entered into the database. Moreover, new stored value programs are quickly and easily created through selection and arrangement of various reusable, shared objects stored in the database.

## BRIEF DESCRIPTION OF THE DRAWING FIGURES

The above and other objects, features and advantages of the present invention are hereinafter described in the following detailed description of illustrative embodiments to be read in conjunction with the accompanying drawing figures, wherein like reference numerals are used to identify the same or similar parts in the similar views, and:

Figure 1A is an exemplary entity relationship diagram of prior art administration servers for stored value products;



5           Figure 1B is an exemplary entity relationship diagram of prior art  
administration servers for stored value products with limited functionality  
sharing;

10           Figure 2A is an entity relationship diagram of a first exemplary  
5   embodiment of the present invention.

15           Figure 2B is an entity relationship diagram of a second exemplary  
embodiment of the present invention.

20           Figure 3 is an entity relationship diagram showing exemplary data flows  
for creating and initializing a new stored value account.

10           Figure 4 is an entity relationship diagram showing exemplary data flows  
for transaction processing.

25           Figure 5 is an entity relationship diagram showing exemplary data flows  
for report generation.

30           Figure 6 is an entity relationship diagram of an exemplary embodiment  
15   of a database server based transaction system.

35           Figure 7 is a functionality pyramid showing an exemplary arrangement  
for a database server.

40           Figure 8 is an entity relationship diagram showing data flows for an  
exemplary implementation of the database authorization.

20           Figure 9 is an entity relationship diagram showing an exemplary  
relationship between various objects in the database.

## DETAILED DESCRIPTION OF PREFERRED EXEMPLARY EMBODIMENTS

Referring to Figure 2A, a preferred embodiment of the invention suitably includes a system 20 which includes a database server 116 that suitably supports a number of stored value products such as, for example, various brands of smartcards, magnetic stripe cards, ATM cards, Internet transaction accounts, or other stored value products. Database server 116 generally provides centralized management of the various products, and preferably includes a database (such as a relational or object oriented database) that centralizes data and procedures to be shared across the various stored value products.

As shown in Figure 2A, client system 138 is any device or entity that is suitably configured to include particular functionalities and to interface with a common server. Client systems 138 preferably include only the functionality that is unique to the particular client system 138, such as, for example, sales and pricing information and interface handling. In other words, most common functionality is located and shared at database server 116 such as, for example, card/account creation, addition of funds, account information, report information and/or the like (the details of the functionality are described below with respect to Figure 8). In a particularly preferred embodiment, client system 138 represents a particular brand of a smart card. Client systems 138 suitably transmit data to database server 116 corresponding to the creation of new stored value cards/accounts and to the addition of funds in the stored value account. In alternative embodiments of the invention, client systems 138 suitably receive data such as account information and report information

5 from database server 116. Alternatively, as can be seen from Figure 2B,  
database server 116 interacts with client systems 138 through intermediating  
modules such as report generator 136 and card production system 128. In  
10 other embodiments, client 138 resides on database server 116, operating as  
5 a separate process. In still other embodiments, clients 138 are eliminated  
entirely and consumers and business entities interact directly with database  
15 server 116.

Server 116 preferably supports two modes of interacting with clients  
20 138. The first mode of system 20 (shown by clients 138A, 138B and 138C in  
10 Figure 2A) is typically referred to as a "centralized back end" or "centralized  
back office" because the client 138 merely acts as a "front end" (i.e. interface)  
25 for database server 116 which primarily handles data management functions.  
In embodiments wherein client 138 is a business entity, representatives of the  
30 client business entity provide information to database server 116  
15 electronically, through online CSR input, or other means.

The second mode of system 20 (commonly called the "decentralized  
35 back end" or "decentralized back office") suitably incorporates a franchise  
server 142 between client systems 138D-E and database server 116.  
40 Franchise server 142 suitably interfaces with stored value products from  
20 several different organizations while retaining centralized data management  
in database server 116. In a particularly preferred embodiment, franchise  
45 server 142 supports a business entity having several customers  
corresponding to clients 138. As can be seen from Figure 2A, a single  
50 database server 116 is preferably configured to simultaneously supporting

multiple centralized and decentralized back office client systems 138.

Alternatively, multiple database servers 116 are configured to interface with any combination of centralized or decentralized franchisers 142.

The various servers and clients discussed above are suitably connected through any electronic communication media including, for example, telephone links, leased lines, frame relay or asynchronous transfer mode connections, local area networks, or wide area networks. Alternatively, the client systems and servers are suitably interconnected through any combination of two or more data communications media. Although the communications links between client systems and server are preferably available at all times, some embodiments of the invention use polling or batch processing schemes whereby client systems and servers interact only at predetermined time periods. Alternatively, persons representing business entities provide information to database server 116 through any form of communication including telephone, Internet, mail or any other suitable means.

As can be seen in the exemplary embodiment shown in Figure 3, in use, a client 138 preferably notifies database server 116 of a consumer 100 request for a new card. In other embodiments of the invention, client 138 is bypassed and a new card request from a consumer 100 is provided to database server 116 electronically, or through a customer service representative, or through another means. After processing the new card request as discussed below, database server 116 preferably sends a message to card production system 128 which suitably creates a new card by

5 known card creation methods and the new card is forwarded to consumer  
100. Card production system 128 also suitably notifies the relevant client 138  
(if applicable) that a card has been created.

10 After the card is created and sent to consumer 100, in preferred  
5 embodiments of the invention, consumer 100 activates the card prior to use.  
Activation is preferably accomplished through an activation server 132 that  
15 receives information about new cards from database server 116, preferably  
either in real time as cards are created, or alternatively, activation server 132  
20 receives information in batches at predetermined periods of time. Various  
10 activation servers are known in the prior art and activation server 132 may be  
implemented internal or external to the present invention. To activate the  
25 card, consumer 100 suitably contacts activation server 132 via telephone,  
Internet or another connection to verify the consumer's identity. Consumer is  
30 verified through any suitable verification method, including recitation of a  
15 number printed on the card (or mailed with the card) or recitation of some  
identifying information about consumer 100 such as the consumer's social  
35 security number or parent's name. If the identity of consumer 100 is properly  
verified, then activation server 132 suitably notifies a transaction authorization  
40 system 108 that the card is approved for use. Various transaction  
20 authorization systems are known in the prior art and transaction authorization  
system 108 may be implemented internal or external to the present invention.

45 If the card is rejected, consumer 100 is preferably connected by  
telephone, Internet or other means to a customer service representative  
50 (CSR) 134 who verifies (preferably through online access to either client 138

5 or database server 116) the consumer's ability to use the stored value card or  
account. If the account is rejected by CSR 134, then the card or account will  
10 remain blocked and authorization system 108 rejects any use of the card or  
account. If the CSR is able to verify consumer 100 and the card/account,  
5 then CSR 100 preferably sends a "remove block" or comparable message to  
authorization system 108 so that consumer 100 may properly use the verified  
15 and activated account.

If consumer 100 wishes to add value to the previously created  
20 card/account, the consumer generally provides the added funds to a client  
10 138 (via any communication means such as telephone, Internet, POS  
terminal, ATM machine, or the like) which in turn suitably passes the  
25 information to database server 116, causing database server 116 to update  
the consumer's account. In alternative embodiments, consumer 100  
30 provides value directly to database server 116 in the form of a check or credit  
15 card number that may be electronically entered, or manually entered by a  
CSR. Alternatively, consumer 100 adds value to a card/account via, for  
35 example, a point of sale terminal, ATM machine, Internet connection or  
telephone connection. Funds are preferably recorded in database server 116  
40 through a real-time or batch processing scheme.

20 Figure 2A shows an exemplary direct bi-directional flow of information  
between client 138 and database server 116. In contrast, the exemplary  
45 embodiments shown in Figures 2B and 3 show database server 116 receiving  
information directly from clients 138A-C while providing data to clients 138A-C  
50 through intermediating systems 128 and 136. For example, database server

5 116 provides information to client 138 preferably by sending a "generate  
report" or similar message with all necessary parameters of the data to report  
generator 136 as shown in Figure 3. Alternatively, database server 116  
10 provides the report directly to client 138 through a telephone, Internet, or  
5 other connection.

15 Transaction processing is preferably managed through interaction  
between database server 116, authorization system 108, and a transaction  
capture and routing server 112. As can be seen from Figure 4, database  
20 server 116 suitably communicates card/account status information to  
10 authorization system 108. Status information generally includes account  
balance updates, status changes or the like for the various card accounts.  
25 For example, new cards are preferably assigned a "hold" status in  
authorization system 108 until consumer 100 initializes and validates the card  
as described above, at which time the authorization system preferably  
30 changes the status from "hold" to "pass" (or similar terms). A "hold" status is  
15 also preferably assigned if an account balance decreases below a minimum  
amount, or if a card is lost or stolen or the like. Accounts/cards that are  
35 assigned a "hold" status are preferably rejected by authorization system 108  
in any subsequent requests for transaction approval.  
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20 Point of sale terminal 104 is any device that is capable of identifying and  
gathering data from any stored value product. For example, point of sale  
45 terminal 104 could be implemented as an actual terminal in a store, an  
Internet server, a telephone system, a card reader in a vending machine, an  
automatic teller machine, or any other device that is capable of accepting  
50

5 stored value information in financial transactions. Point of sale terminal 104  
suitably communicates with authorization system 108 to approve or reject  
transactions based upon information available to the authorization system  
10 108 from database server 116. Alternatively, authorization system 108  
5 supplements information from database server 116 with information obtained  
from other external sources (not shown) such as external authorization  
15 systems, credit reporting bureaus, etc. Authorization preferably takes place in  
real time, but in some embodiments the authorization is accomplished using a  
polling or batch processing scheme. In a preferred embodiment, when a  
20 consumer 100 presents a stored value card or enters an account at a point of  
sale terminal 104, the terminal sends an authorization request for the  
25 transaction to authorization system 108. Additionally, for some transactions  
(such as those involving very small amounts of money) point of sale system  
30 108 may not transmit an authorization request at all. Although authorization  
15 may take place over any communications medium, authorization preferably  
occurs over a data communications link such as a telephone link, a leased  
35 line, the Internet, a wide area network, or the like.

If the transaction is authorized, the transaction is preferably completed  
40 at point of sale terminal 104. Point of sale terminal 104 generally requests  
20 information such as the transaction amount and the identity of the stored  
value product used to pay for the transaction and this information is then  
45 suitably transmitted to transaction captive module 112 for settlement. To  
facilitate batch processing of settlement requests, merchants generally store  
50 information for multiple transactions. Alternatively, settlement requests are



5 suitably transmitted in real time or are suitably polled by transaction capture  
module 112.

10 With continued reference to Figure 4, capture module 112 suitably  
captures financial transaction data from POS terminal 104 and routes this  
5 information to database server 116. During a purchase transaction involving  
a stored value product, funds are suitably transferred from an account  
15 associated with a stored value card into a merchant's account. Records for  
card and merchant accounts are generally accessible by database server  
20 116, and are preferably maintained within database 142 (not shown in Figure  
10 4). A balancing system 118 is preferably located between database server  
116 and transaction processing module 112 to verify transaction data.  
25 Balancing system 118 is any computer system that provides a check based  
upon data received from database server 116 and transaction processing  
30 module 112.

15 As best shown in Figure 5, a single report generator 136 preferably  
generates reports (1) for customers using stored value products, as described  
35 above; (2) for merchants 140 that accept stored value products as  
compensation for goods or services; or (3) for consumers 100 that receive, for  
40 example, periodic statements of their accounts and transactions.  
20 Alternatively, multiple report generators 136 create various reports. As  
another alternative, database server 116 internally generates some or all  
45 reports without the use of an external report generator 136. In some  
embodiments of the invention, reports are generated in real-time (i.e. as  
50 requested by the account manager, the consumer, the database server 116,

5 or any another entity). Alternatively, reports are processed in varying  
embodiments in batches, at predetermined times, when polled by the report  
generator, or by any other timing arrangement. Report generator 136  
10 preferably retrieves relevant data from a database associated with database  
server 116. In other embodiments, database server 116 provides necessary  
15 data to report generator 136 as part of a report generation request.  
Alternatively, database server 116 suitably sends a pointer (such as a  
memory address accessible via a shared bus, or a uniform resource locator  
20 (URL), or any other pointer) to information that is stored. After obtaining data  
10 for the report requested, report generator 136 formats the data and provides  
the data to the proper client system 138. Various report generating systems  
25 are known in the prior art, and any report formatting system may be used in  
accord with the present invention.

30 Figure 6 shows an exemplary embodiment of a combined system for  
15 adding cards, handling transactions and processing reports. As can be  
readily ascertained from Figure 6, a preferred embodiment of a stored value  
35 transaction system includes a database server 116 supporting multiple stored  
value products, each product preferably being associated with a particular  
40 client 138. Database server 116 preferably receives input from client 138 and  
20 from a financial capture/transaction routing module 112, as well as optional  
online input from consumers or customer service representatives 134. Stored  
45 value cards and accounts are preferably registered with an authorization  
server 108 that is configured to approve or deny individual transactions at  
50 various point of sale terminals such as terminal 104 in the drawing figures.

5 Preferably, database server 116 communicates with a report generating  
system 136 that is configured to assemble data into reports for client systems  
138, merchants 140 and/or consumers 100, thereby formatting and  
10 simplifying data output from database server 116.

5 As stated above, database server 116 includes common data and  
operations for the various stored value products. Database server 116  
15 preferably retains at least core information 192 and local information 190, as  
shown in Figure 7. Core information 192 generally includes all functions,  
20 data, software and infrastructure that are common to all stored data products,  
10 including database management, interface formatting, transaction  
management and various product features. Local information 190 is  
25 generally non-standard information that is specific to a particular product,  
country or consumer that provides no shared value for other applications.  
30 Local information 190 includes, for example, language details, local currency,  
15 taxes, customs, address formats, and local interface data. Separating local  
information 190 from core information 192 allows flexibility to implement  
35 coding "shortcuts" that may provide the most effective solution to certain  
individual tasks. Shortcuts are possible because some local information 190  
40 is not applicable to core information 192. Moreover, local information 190 is  
20 located at the bottom of the database organizational pyramid shown in Figure  
7, indicating that local data does not substantially update or modify core  
45 information 192. Core information 192, however, frequently modifies local  
information 190. Thus, separating high value business rules and objects (i.e.  
core information 192) from low-level technical infrastructure (i.e. local  
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5 information 190) promotes implementation independence, and hence greatly facilitates the sharing of data and resources between disjoint stored value products.

10 Database server 116 generally retains information substantially within a database 142 that is preferably a relational or object oriented database. In a particularly preferred embodiment, database server 116 is an AS/400  
15 computer running DB/2 database server software available from the IBM Corporation of Armonk, New York. In other exemplary embodiments, database 142 is implemented using SQL Server (available from the Microsoft  
20 Corporation of Redmond, Washington), ORACLE Database Server (available from the Oracle Corporation of Redwood Shores, California) or ADAPTIVE Server (available from the Sybase Corporation of Emeryville, California) running on any form of computer hardware.

30 In a preferred embodiment, database 142 is separated into various logical subsystems generally identifying particular classes of objects. Classes of objects generally include, *inter alia*, functions and attributes. "Functions"  
35 correspond to operations performed by objects of the particular class. "Attributes" correspond to characteristics that objects of the class exhibit. For example, a "smartcard" class generally contains functions for creating new  
40 cards and adding value to existing cards, as well as attributes that identify cardholders and accounts. Subsystem classes as shown in Figure 7, then, generally contain objects that perform related functions and/or retain related  
45 information.

5 Database 142 preferably contains a "key" field that partitions the  
database according to a high-level class of objects. An example of a "key"  
field is the "business unit" class 188 shown in Figure 7. In the exemplary  
10 embodiment shown in Figure 7, the "business unit" class 188 organizes the  
5 database into partitions corresponding to, for example, a company  
organizational structure. Alternate embodiments of the invention organize  
15 database 142 in radically different fashions by using differing key fields. For  
example, the key could be used to logically separate database 142 according  
20 to geographic region (e.g. "North America", "Europe" and "Asia"), or  
10 according to product classes (e.g. "Smartcard", "ATM card", "Internet  
account" and the like), or according to any other suitable differentiator. Key  
25 object class 188 substantially defines many of the default values for various  
dependent classes because objects depending from key object class  
generally inherit substantially all of the attributes and functions defined for the  
30 parent class. In an embodiment that uses "business unit" as a key class 188,  
15 for example, all database objects that reside in the same business unit  
generally share common default currencies, languages, product details,  
35 address masks and the like.

40 Regardless of the particular key field 188 selected, in preferred  
20 embodiments the key field 188 logically separates objects maintained on  
database 142. Objects with differing "key" values 188 are preferably  
45 separated by hardware or software "firewalls" that partition database 142  
based upon the key. A firewall is any mechanism that prevents access  
50 across a logical boundary. Although the firewalls are preferably implemented

5 as software access controls, alternate embodiments include user  
ID/password schemes or hardware controls such as router-implemented  
access restrictions. Alternatively, multiple firewall techniques such as  
10 physical access controls and software controls are combined. Firewalls  
5 generally preserve business unit autonomy and data integrity by isolating data  
according to, for example, the key field.

15 In a preferred embodiment, secondary classes 186 depending from key  
class 188 are created to substantially define individual stored value programs.  
Each of these secondary classes 186 generally depends from the key class  
20 188. Alternatively, intermediate classes (corresponding to geographic  
region, business sub-units, or any other suitable form of differentiator) exist  
25 between the highest level key class 188 and the "products" class 186. In the  
exemplary embodiment shown in Figure 7, secondary object class 186  
30 differentiates various products belonging to the same key class 188. Objects  
15 belonging to the secondary "product" class 186 inherit attributes and functions  
from the applicable parent "business unit" class 188.

35 The exemplary embodiment shown in Figure 8 includes a "business  
unit" key 188 that separates database 142 into Business Unit One (BU1) 146  
and Business Unit Two (BU2) 148. Objects BU1 146 and BU2 148 in Figure  
40 8 are instances of the key "business unit" class 188, and elements 150, 152,  
20 154, 156, and 158 are instances of secondary "product" class 186. In the  
example shown in Figure 8, objects 150, 152, and 154 depend from object  
45 BU1 146, and objects 156 and 158 depend from object BU2 148. Each of the  
product objects 150, 152, 154, 156, and 158 represents a separate stored  
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5 value product such as a particular smartcard program, ATM card program, or  
the like. For example, both product object 150 and product object 156 could  
define smartcard products, even though these two objects depend from  
10 different business units. Although the two "smartcard" classes are distinct  
from each other and each preferably contains independent local data,  
15 functions and attributes, the two object classes preferably share functions and  
attributes as described below.

With continued reference to Figure 8, database 142 preferably includes  
20 an object repository 144 that generally functions as a library of objects.  
10 Objects retained within repository 144 suitably perform various functions or  
retain particular formats of data, as described below. These objects are  
25 suitably utilized by objects of key class 188 and secondary class 186, as well  
as any intermediating classes (not shown). Objects contained in repository  
30 144 generally provide core functionality required by the various product  
15 objects 186. Because each product object 186 has access to the entire  
repository 144 of core information, objects stored in repository 144 are  
35 effectively shared and re-used by the various key objects 188 and secondary  
objects 186, thus resulting in substantially reduced programming effort and  
40 implementation time. Moreover, many objects contained within repository  
20 144 suitably utilize other objects in the repository.

Different embodiments organize the various classes depending from the  
45 key class 188 in a variety of ways. Although repository 144 is shown in  
Figure 8 as distinct from objects belonging to key class 188 and secondary  
class 186, this distinction is a logical distinction made for purposes of  
50

5 explanation only. One skilled in the art would understand that any  
organization of database 142 would fall within the scope of the present  
invention. For example, database 142 could be organized hierarchically,  
10 sequentially or in any another suitable manner. Objects in database 142 are  
5 preferably organized in a manner that provides optimum performance while  
efficiently using hardware resources such as storage space and memory on  
15 database server 116.

Repository 144 generally includes various groupings of objects (called  
20 "subsystems") that have similar attributes or that perform similar functions.

10 Although particular subsystems are described herein and in the  
accompanying drawings, one skilled in the art would appreciate that various  
25 object groupings could be formulated that are within the scope of the  
invention. For example, any of the groupings presented herein could be  
eliminated, or additional groupings could be added. Moreover, the various  
30 objects could be arranged in any of a variety of subsystems. The various  
15 subsystems of an exemplary preferred embodiment of repository 144 are  
discussed below.  
35

With continued reference to Figure 8, the various subsystems within  
40 repository 144 will now be described. Funding subsystem 158 within  
20 repository 144 generally includes objects that add value to stored value cards.  
Funding features are generally selected according to relevant product classes  
45 so that funds from many sources may be applied to many different stored  
value products without requiring individualized programming for each product.  
For example, an "ATM account transfer" object defines a process for  
50



5 transferring money from a consumer's checking account to a stored value  
card in response to the consumer's input at an ATM. Once defined, this  
object is preferably used by multiple product objects such that the same  
10 software code facilitates ATM transfers to smartcards, phone cards, and other  
stored value products. The funding subsystem preferably includes such  
15 features as funding delays, input of batch funds, applying funding fees,  
applying funds at a card or an account level, or handling suspended/held  
funds.

20 Customer records are preferably maintained in a customer data  
10 subsystem 172 that generally implements a single database record for each  
customer even though the customer may use multiple stored value products.  
25 Card data, account data, client data customer data and the like all generally  
reside within client demographics subsystem 172, which frequently  
30 communicates with objects from the products, funding, transaction processing  
15 and address subsystems described herein. Additionally, many user interface  
elements such as screens and access control are generally contained within  
35 the client demographics subsystem.

40 Objects associated with merchant data subsystem 168 generally enable  
specific merchant processing options. Other objects preferably store contract  
20 information relative to specific merchant product offerings, such as special  
offers or joint marketing efforts such as rebates, loyalty awards, etc.  
45 Merchant data subsystem also preferably includes accounts payable objects  
that enable merchants to capture stored value transactions for settlement.

5           Addresses (including, for example, customer billing addresses,  
merchant addresses and the like) are preferably maintained in address  
subsystem 160. Address subsystem 160 generally houses address  
10 information and provides an interface with all other subsystems needing  
5 address information, such as the client and merchant data subsystems 172  
and 168, respectively. Address subsystem 160 suitably provides a single  
15 point for maintaining substantially all of the address information stored in  
database 142, and preferably supports multiple addresses for each person  
20 (e.g. home, business and Internet addresses, among others). Other objects  
10 in address subsystem 160 preferably support temporary addresses, optionally  
with an associated "effective date" such that forwarding addresses, traveling  
25 addresses, and the like are supported.

Transaction processing subsystem 170 generally includes objects for  
30 storing and managing financial and non-financial transactions. Preferably,  
15 many objects associated with transaction processing subsystem 170 contain  
mechanisms to provide substantially real time access to financial data by, for  
35 example, customer service representative 134 as described above for online  
transaction inquiries. Preferably, transaction processing subsystem 170 is  
also accessible by at least customers and merchants. Transactions are  
40 generally formatted by type (e.g. airline, car rental, retail purchase, and the  
20 like) such that transaction records are easily searchable.

45           Preferably, repository 144 includes a spend management subsystem  
176 that includes objects that implement various product-specific spend  
management rules. For example, spend management rules may allow  
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5 certain cards to only be used at specified merchants within a particular  
geographic region, or within a specific time period. Alternatively, spend  
management subsystem 176 may also provide available balance information  
10 to consumers or to external authorization system 108. Preferably, spend  
management subsystem includes objects that are configured to track  
15 spending patterns of cardholders/consumers to assist in determining product  
effectiveness.

Repository 144 preferably includes an input/output (I/O) management  
20 subsystem 174 that includes objects for funneling interface data in and out of  
database system 116. Preferably, I/O management subsystem 174 includes  
10 objects that track, manage and log data sent and received by database  
25 system 116. In a preferred embodiment, I/O management subsystem 174  
contains mechanisms for real-time access to database information that are  
30 utilized by, for example, CSRs and customers needing access to data  
retained transaction processing subsystem 170.  
15

Financial control subsystem 164 generally includes objects that are  
35 configured to substantially protect the financial integrity of database system  
116. Generally, financial control system 164 receives data from external  
40 financial capture system 112, as well as funding subsystem 158 to maintain  
20 accurate account balance information. Financial control system 164  
optionally includes objects that implement an interface to disputes and  
45 adjustments subsystems (not shown).

Data sharing between various objects and classes is preferably  
50 facilitated by a structures subsystem 166 that suitably combines groups of

5 cards, accounts or merchants into common classes. The structures  
subsystem 166 establishes and maintains hierarchial relationships  
established by customers, corporations, governments and the like by defining  
10 data structures corresponding to these relationships. These data structures  
5 are suitably utilized to group members of a particular hierarchy together  
15 across various stored value products. In a preferred embodiment, structures  
subsystem 166 suitably allows viewing and reporting of such classes  
according to predefined hierarchies. Defining various relationships into  
20 structures presents several advantages over treating entities within the  
10 hierarchy individually. First, the data structures facilitate easy movement,  
copying and transferring of information from one entity to another because  
25 only the data structure (and not each individual member) need be moved.  
Secondly, structures may be suitably modified as a class, thereby reducing  
30 the need for changes to individual objects corresponding to members of the  
15 class. For example, if a data structure represents individuals belonging to a  
hierarchy (such as a corporate reporting structure) and the name of the  
35 hierarchy changes, the change need only be entered once (in the data  
structure object) and not in every object corresponding to every member of  
40 the hierarchy.

20 Database server 116 preferably includes a security subsystem 162 that  
includes objects for managing security controls throughout the database.  
45 Users generally are assigned one of various levels of authority based upon  
the user's need to obtain information. Security restrictions are preferably  
50 implemented at many levels in the database 142, including at the key class

188 level and the product class 186 level. Objects in security subsystem 162 generally implement the firewalls discussed above.

Objects from output subsystem 178 generally provide formatting and control of data output from database 142. In a preferred embodiment, outputs are administered by three separate optional subsystems corresponding to letters 180, reports 182 and statements 184. In other embodiments, a single output subsystem 178 provides all outputs. Letters module 180 preferably contains objects for generating and producing letters such as, for example, automated letters, event driven letters (e.g. negative balance, collections, etc.), CSR initiated letters (service, dispute resolution, etc.) and legal notifications (change in terms, legal disclosures, etc.). The reporting module preferably includes objects for scheduling, creating, and maintaining all database reports. In a preferred embodiment, objects included in report module 182 interfaces with external report generator 136 for actual report creation. Alternatively, objects included in reporting module 182 substantially prepare and format reports, thereby incorporating the functionality of external report generator 136. Objects associated with the statements module 184 preferably create or format database statements such as periodic bills. Objects included in output generation subsystem 178, 180, 182 and 184 preferably produce output via selectable media such as fax, paper, Internet or any other information transmission media.

Referring now to Figure 9, stored value products 186 are created using various objects from repository 114. Generally speaking, users create new products in accordance with a particular business unit 188 by selecting

5 suitable objects from repository 114 that correspond to those attributes and  
functionalities desired in the new product 186. For example, a user may  
10 select, among others, an object for creating a card, various objects for storing  
value in an account associated with the card (or on the card itself), an object  
5 to manage financial transactions, and an object to generate reports for  
consumers. When these objects are selected, database server suitably  
15 assembles a product structure that references the various objects requested.  
In a preferred embodiment, product structures are tables of pointers to the  
20 various objects in repository 114, but any suitable method of organizing the  
various objects (such as in a data structure or in a database record) could be  
10 used. When the product executes, database server 116 retrieves the  
25 particular objects requested. Because this method of constructing products  
substantially reuses objects of pre-written code, design and implementation  
30 times are significantly reduced.

15 The corresponding structures, materials, acts and equivalents of all  
elements in the claims below are intended to include any structure, material  
35 or acts for performing the functions in combination with other claimed  
elements as specifically claimed. The scope of the invention should be  
40 determined by the appended claims and their legal equivalents, rather than  
20 by the examples given above.

**Claims**

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We Claim:

1. A system for administering a plurality of stored value products,  
the system comprising:
  - a database server comprising a database, the database including a plurality of objects such that at least one of the objects simultaneously associates with more than one of the plurality of stored value products; and
  - a point-of-sale terminal in communication with the database server, the point-of-sale terminal receiving transaction data from at least one of the stored value products, and of providing the transaction data to the database server.
2. The database server of claim 1 further comprising an authorization server in communication with the database server and the point-of-sale terminal.
3. The database server of claim 2 wherein the point-of-sale terminal queries the authorization server for transaction approvals.
4. The system of claim 1 further comprising a plurality of clients, each client corresponding to one of the plurality of stored value products, and each client being in communication with the database server.



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5. The system of claim 5 wherein the client is implemented on a digital computer.

10

6. The system of claim 1 wherein the plurality of objects comprises data structure objects.

15

7. The system of claim 1 wherein the plurality of objects comprises consumer information that is available to each of the plurality of stored value products.

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8. The system of claim 1 wherein the plurality of objects comprises merchant information that is available to each of the plurality of stored value products.

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9. The system of claim 7 wherein the plurality of objects comprises merchant information that is available to each of the plurality of stored value products.

40

10. A database server for plurality of stored value products, the database server comprising a digital computer and a database, the database comprising:

45

a key field having attributes;

a secondary field having a plurality of instances, each instance inheriting

50

the attributes from the key field; and

55

5                   7           a repository having a plurality of objects, each object providing a  
8                   8           functionality and associating with each of the plurality of  
9                   9           instances.

10  
11           The database server of claim 10 wherein the secondary field  
15 identifies one of the stored value products.

12           The database server of claim 10 wherein the plurality of objects  
20 comprises consumer information.

13           The database server of claim 12 wherein the consumer  
25 information is accessible to each of the plurality of stored value products.

14           The database server of claim 11 wherein the plurality of objects  
30 comprises consumer information.

15           The database server of claim 14 wherein the consumer  
35 information is accessible to each of the plurality of stored value products.

16           The database server of claim 10 wherein the plurality of objects  
40 comprises merchant information.

17           The database server of claim 14 wherein the merchant  
45 information is accessible to each of the plurality of stored value products.  
50

5                   18.    The database server of claim 15 wherein the plurality of objects  
comprises merchant information.

10                   19.    The database server of claim 18 wherein the merchant  
information is accessible to each of the plurality of stored value products.

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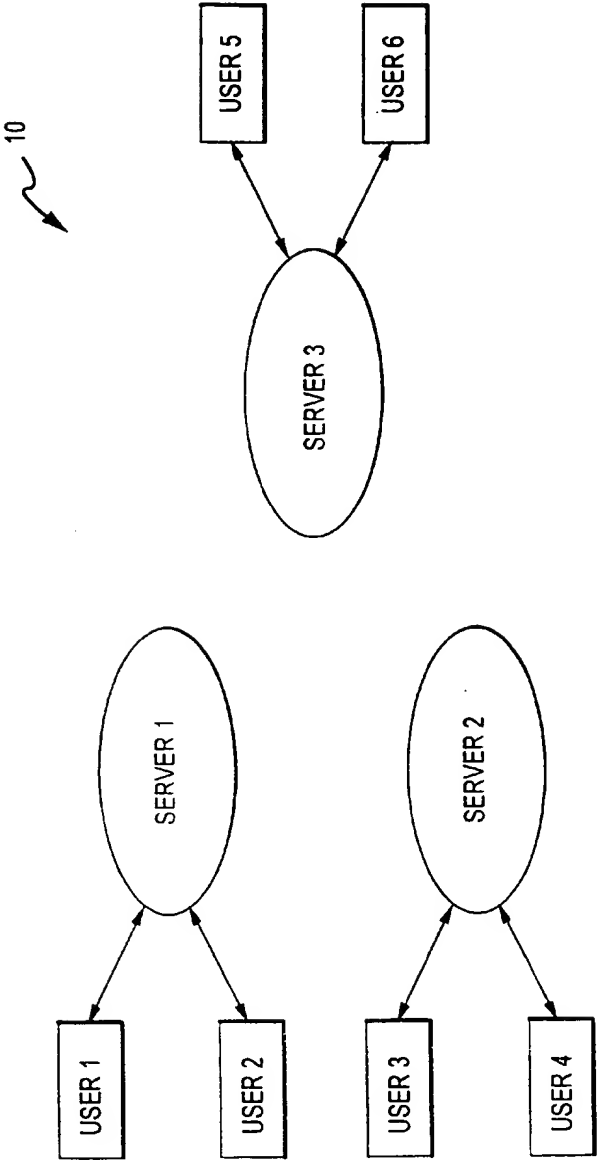
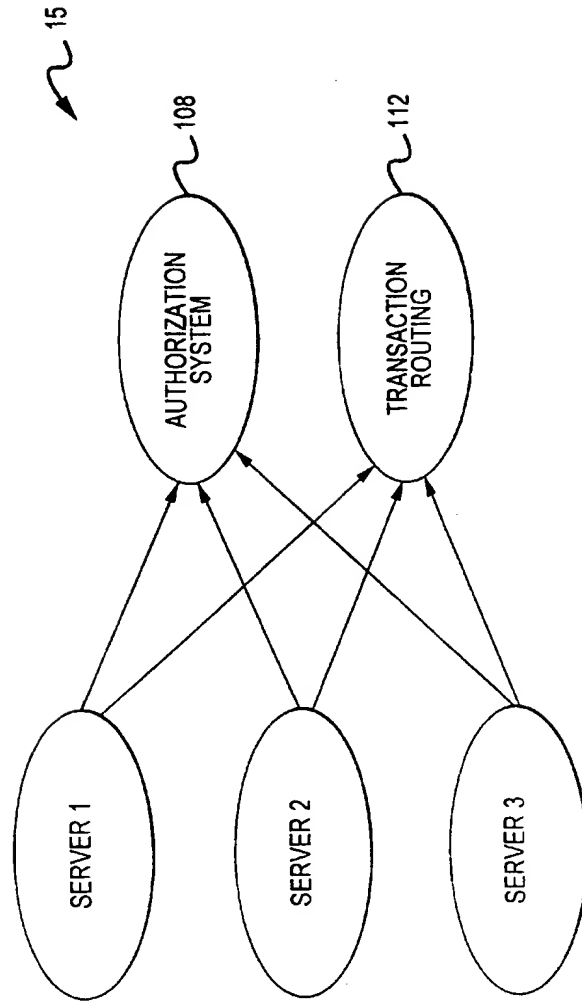


FIG.1A



PRIOR ART

FIG.1B

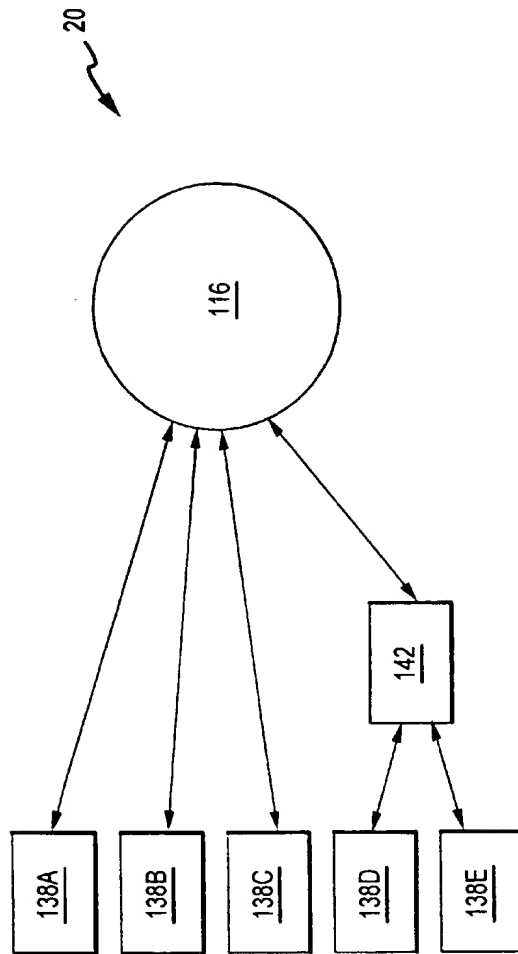


FIG.2A

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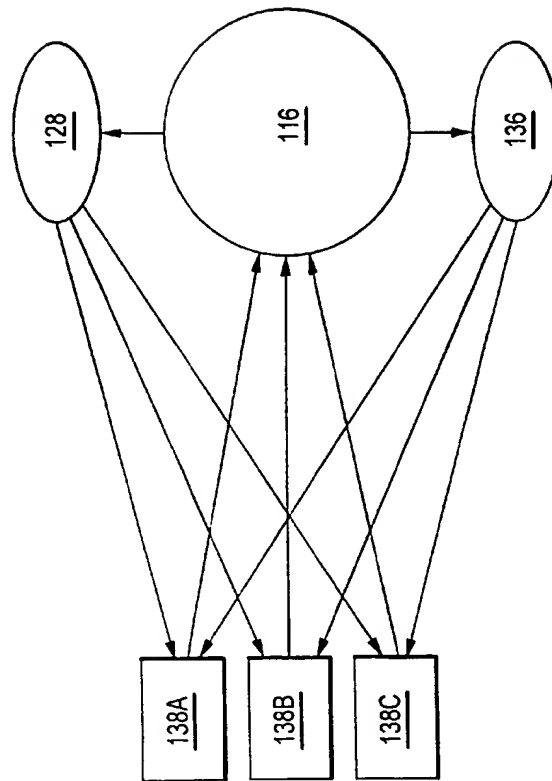


FIG.2B

30

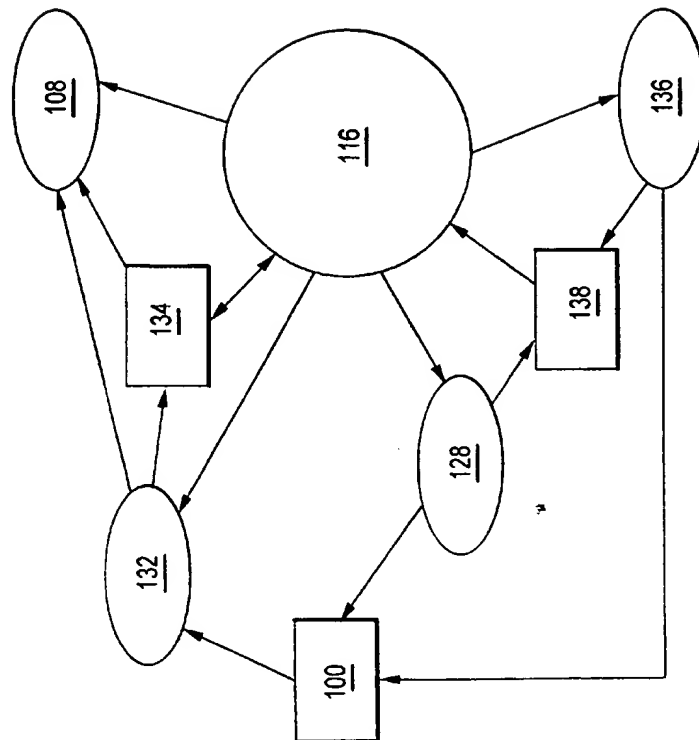


FIG.3



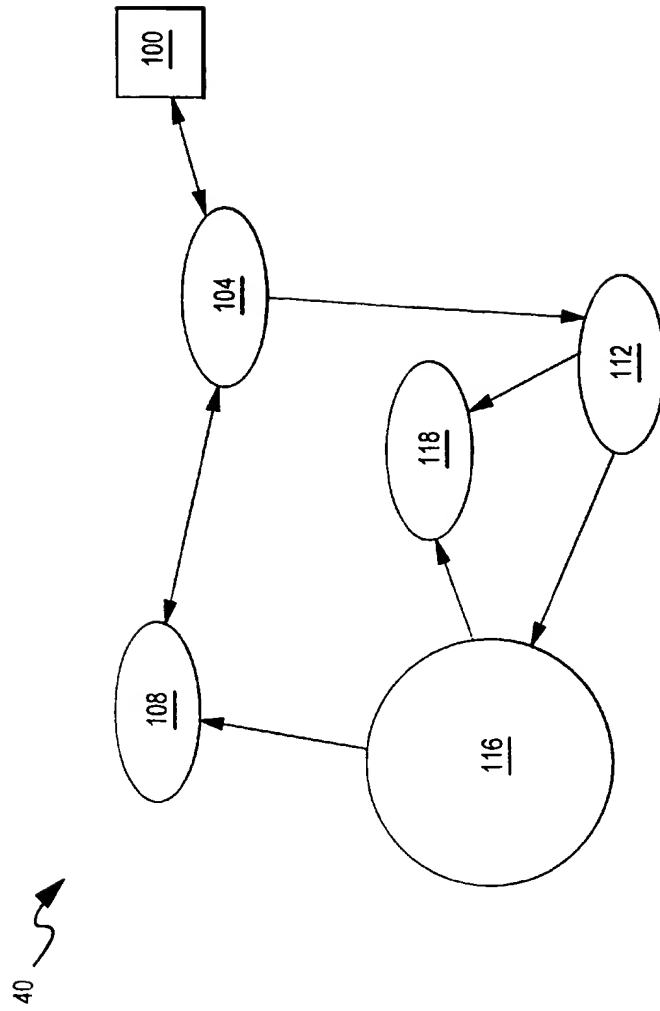


FIG.4

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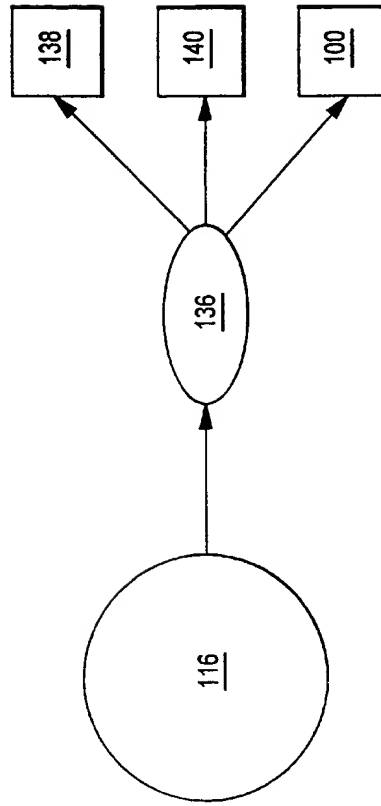


FIG.5

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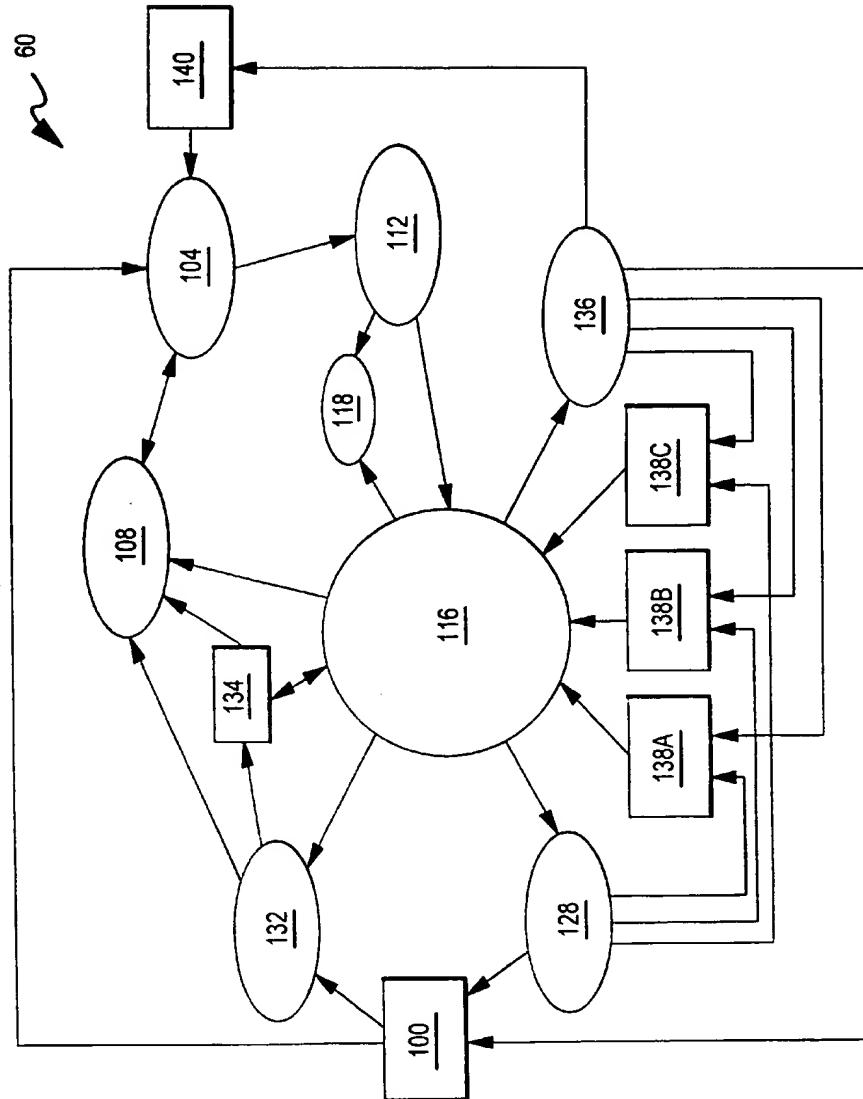


FIG.6

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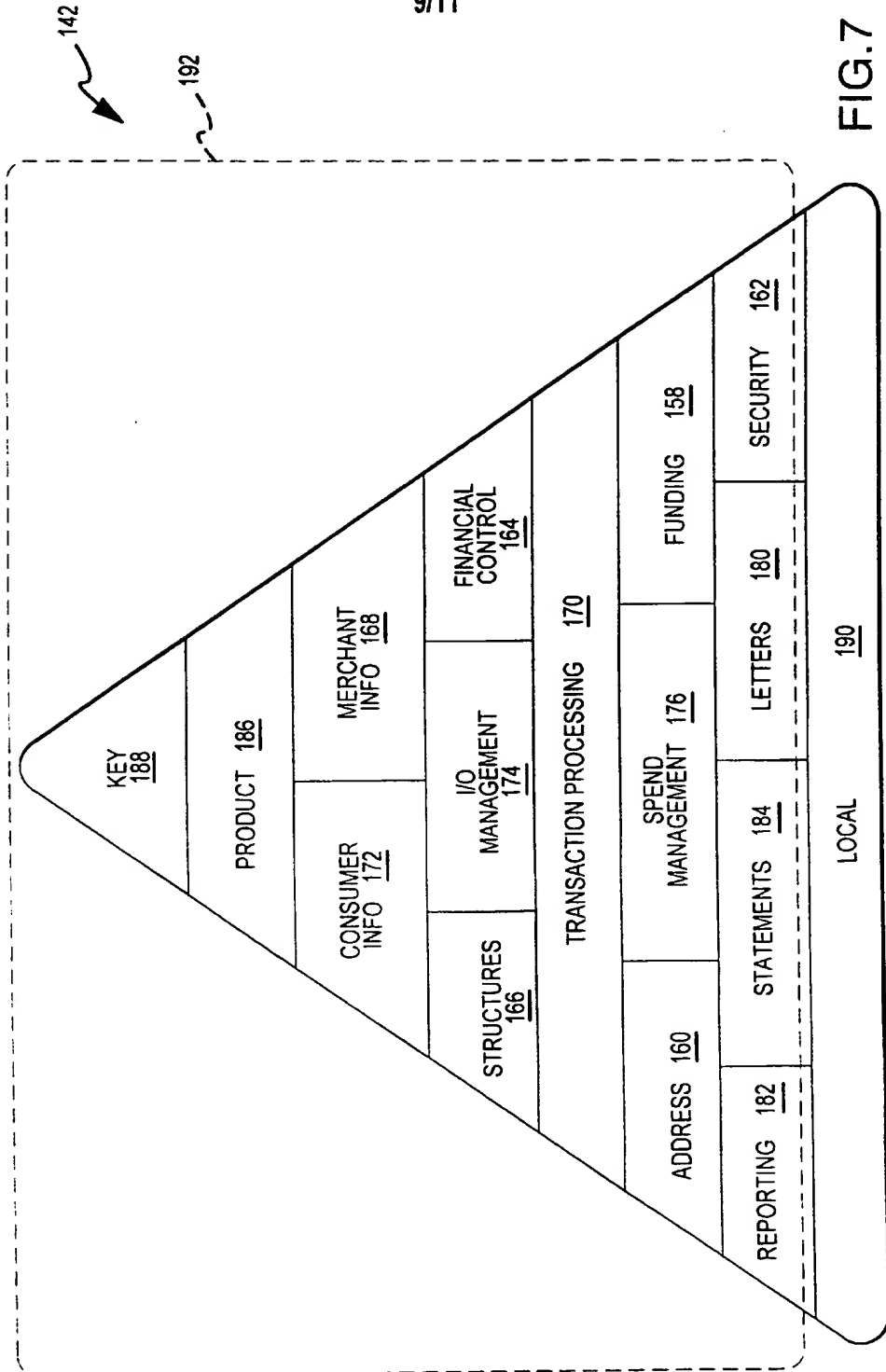
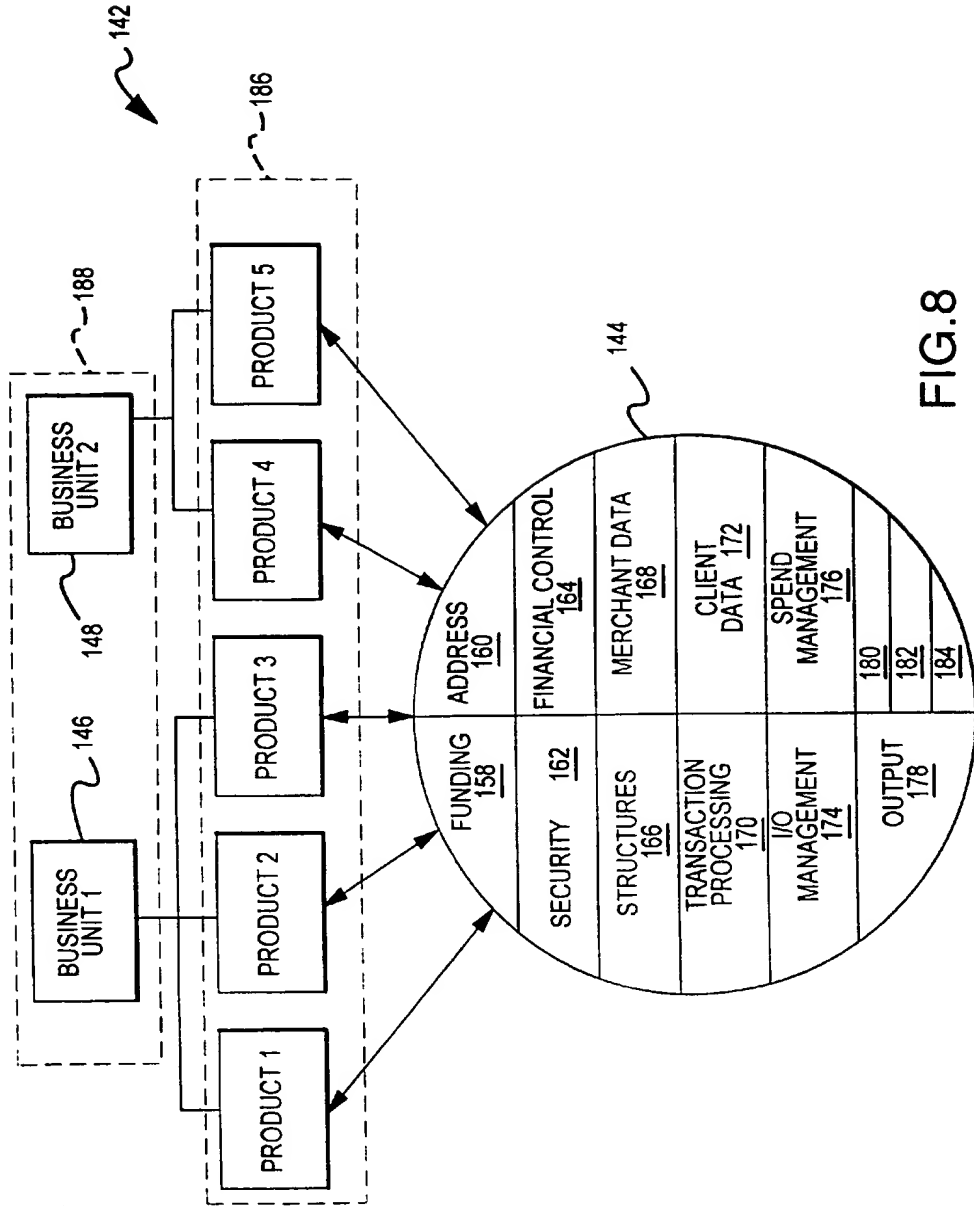


FIG. 7

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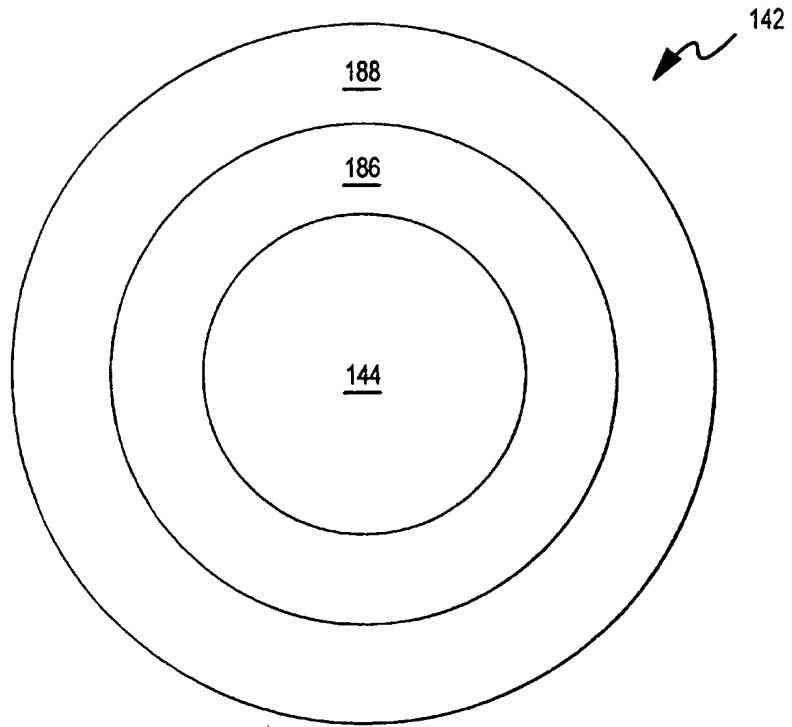


FIG.9

## INTERNATIONAL SEARCH REPORT

International Application No.

PC/US 99/12118

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 G06F17/60 G07F7/10

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G06F G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 99 05633 A (MAIN STREET MARKETING) 4 February 1999 (1999-02-04) the whole document ---	1-19
A	US 4 851 650 A (KITADE) 25 July 1989 (1989-07-25) the whole document ---	1-19
A	WO 98 08175 A (LEIRFALL ET AL) 26 February 1998 (1998-02-26) the whole document ---	1-19
A	WO 97 10560 A (CYBERMARK, L.L.C.) 20 March 1997 (1997-03-20) the whole document ---	1-19
	--- -/-	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

29 September 1999

Date of mailing of the international search report

06/10/1999

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# INTERNATIONAL SEARCH REPORT

International Application No  
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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information on patent family members

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PC1/US 99/12118

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